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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/020,384	12/06/2001	Gary F. Feierbach	04860P2679	2221

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EXAMINER	
DATSKOVSKIY, MICHAEL V	

ART UNIT	PAPER NUMBER
2835	

DATE MAILED: 06/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/020,384	FEIERBACH, GARY F.	
	Examiner	Art Unit	
	Michael V. Datskovskiy	2835	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 June 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-5,7,9-13,15-23,25-29,31-35,42,43,45 and 46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5, 7, 9-13, 15-23, 25-29, 31-35, 42-43, 45, 46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 06/07/2006 in respect to Rejections of the claims 1 - 2, 5, 11 - 12, 15 - 16, 18 - 22, 25, 42, and 45 under 35 U.S.C. § 102(b) as being anticipated by Downing; and of the claims 4, 7, 9-10, 13, 17, 26-28, 43 and 46 under 35 U.S.C. § 103(a) as being unpatentable over Downing have been fully considered but they are not persuasive. From examiner's point of view, even if a cooling structure includes an elastic heat conductive component (sheet) between a heat conductive part at the bottom end of a flexible bellow, or even if instead said end is soldered (adhered) to a heat generating chip, the flexible bellow will inherently conform the surface of its end with the top of said chip (without soldering or before soldering). The presence of the elastic heat conductive component (sheet) between a heat conductive part at the bottom end of a flexible bellow and the top of the heat generating electronic component does not exclude such a fact, but rather is to make sure that there will always be a full thermal contact between the heat conductive part at the bottom end of the flexible bellow and the heat generating electronic component (some time a thermally conductive grease is used for the same purpose). The whole meaning in the art of using resilient flexible cooling bellows is to use their ability to conform a heat transferring end part of the bellow with a top of heat generating electronic component, when being moved (pressed) against chips by forces of their resilience or coolant pressure.

2. Applicant's arguments, see Remarks, filed 06/07/2006, with respect to Rejection of claims 1 - 3, 7, 10 - 11, 16, 18 - 19, 21 - 23, 29 and 31 under 35 U.S.C. §103(a) as

being unpatentable over Yamamoto, in view of Downing have been fully considered and are persuasive. The Rejection has been withdrawn.

3. From applicant's point of view the deficiency of the reference by Downing is that it does not specify a material of a flexible bellow purposely chosen to provide enough flexibility to guarantee that the bottom end of a flexible bellow will conform the top surface of a chip. Accordingly, to overcome the reference by Downing, Applicant amended the claims. The discussion about material of said bellow being flexible enough to conform a top of a chip, or about obviousness of choosing such a material could go for a long time. Therefore, in order to clarify the prosecution of the application and to shorten the discussion, Applicant's arguments with respect to all pending claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

4. Claim 23 is objected to because of the following informalities: The word: "channel" should be changed to the word: "conduit" (according to the drawings).. Appropriate correction is required.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2, 4-5, 7, 9-13, 15-22, 25-29, 42-43, 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Downing in view of Mittal et al (US Patent 4,450,505).

With respect to claims 1-2, 5, 11-12, 15-16, 18-22, 25, 42 and 45: Downing teaches a cooling device 10, Figs. 1-2, for removing heat from an integrated circuit, said cooling device comprising: a conduit 11, a flexible channel 17 to alternate between a compressed position and an extended position (col. 3, lines 15-37, and col. 4, lines 55-68), and having a first open end and a second closed end, said first open end coupled with said conduit 11, said open end having an internal width, said flexible channel 17 comprised of a resilient material having spring-like characteristics, said material to provide a spring-like restoring force when compressed, the second closed end comprising a thermally conductive material 23 attached to said flexible channel 17, said thermally conductive material 23 having a substantially planar surface to interface directly with said integrated circuit when said flexible channel is extended and to detach from said integrated circuit in said compressed position; an interconnect mechanism between said conduit and said flexible channel to allow a fluid introduced within said conduit to move between said conduit and said flexible channel 17, and a heat sink (18, 19, 21) attached to an interior surface 28 of said closed end to cause heat absorbed by said closed end to be conducted through said conduit 11 and said flexible channel 17. Downing teaches furthermore) said cooling device as in Claim 1, wherein said interconnect mechanism is an opening 22 in a surface of said conduit 11, wherein said flexible channel 17, including said closed end 23, is sealed, and further comprising ports

12 for coupling to a pump coupled to said conduit 11 configured to reduce a pressure in said conduit and said flexible channel to compress said flexible channel and to remove said conductive material from said integrated circuit (col. 3, lines 15-37, and col. 4, lines 55-68). Although the device by Downing is a cooler, it is inherent that a cooled fluid is getting heated after contacting a heat sink and a thermally conductive end 23. Downing does not teach said flexible channel being conformable with a non-planar integrated circuit.

With respect to claims 3, 4, 7, 13, 17, 26-28, 43, 46: Downing teaches all the limitations of the claims except: said flexible channel being conformable with a non-planar integrated circuit; said opening has a width equal to said internal width of said open end (claim 3); certain types of materials used to couple said flexible channel to said conduit (claim 4), or to make said closed end of said flexible channel (claim 7); and certain ranges of the cooling fluid pressure to manipulate expanding of said flexible channel (claims 13, 17, 26-28, 43 and 46). It would have been obvious to one having ordinary skill in the art at the time the invention was made to make said closed end heat sink and said flexible channel from such claimed materials, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice, (*In re Leshin*, 125 USPQ 416), and also it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. With respect to claim 9, Downing teaches all the limitations of the claim except said flexible channel is made of resilient

material comprising a material selected from the group of which phosphor bronze and beryllium copper are members, neither said flexible channel being conformable with a non-planar integrated circuit. With respect to claims 23 and 29, Downing teaches all the limitations of the claims except said flexible channel being conformable with a non-planar integrated circuit; cooling device as in Claim 19, further comprising: a plurality of flow diverters attached within said conduit to create turbulence in said fluid (claim 23); and a cooling device as in Claim 1, wherein said heat sink extends into said conduit in said extended position (claim 29). Mittal et al teach a cooling device 10, Fig. 1, for removing heat from an integrated circuit 30, said cooling device comprising: a conduit 48, a flexible channel 26 having a first open end and a second closed end, said first open end coupled with said conduit 48, said open end having an internal width, said flexible channel 26 comprised of a resilient material – Beryllium Copper having spring-like characteristics , said material to provide a spring-like restoring force when compressed, said material providing to said flexible channel enough flexibility to conform with surface 32 of chip 30 (col. 2, lines 46-59); the second closed end comprising a thermally conductive material 44 attached to said flexible channel 26, said thermally conductive material 44 having a substantially planar surface to interface directly with said integrated circuit when said flexible channel is extended; an interconnect mechanism between said conduit and said flexible channel to allow a fluid introduced within said conduit to move between said conduit and said flexible channel 26, and a heat sink 28 attached to an interior surface of said closed end 44 to cause heat absorbed by said closed end to be conducted through said conduit 48 and said

flexible channel 26; wherein said heat sink 28 extends into said conduit in said extended position, and further comprising: a plurality of flow diverters 29 attached within said conduit to create turbulence in said fluid. It would have been obvious to one having ordinary skill in the art at the time invention was made to made said flexible channel in the device by Downing from Beryllium Copper as it is don e by Mittal et al, and also to extend said heat sink into said conduit and to provide flow diverters, as it is also done by Mittal et al, in order to enhance heat dissipation of the device.

6. Claims 10 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Downing in view of Mittal et al as applied to claims 1 and 29 above, and further in view of Yamamoto et al (Previously cited US Patent 4,729,060).

Downing in view of Mittal et al teach all the limitations of the claims except a cooling device as in Claim 1, wherein said resilient material is pleated (claim 10); and A cooling device as in Claim 29, wherein said heat sink comprises a plurality of spaced apart planar fins (claim 31). Yamamoto et al teach a cooling device 10, Figs.1, 11, for removing heat from an integral circuit (IC) 7, said cooling device comprising: a conduit 1; a sealed flexible channel 5 having a first open end and a second thermally conductive closed end 3, said flexible channel is made of a resilient material having spring-like characteristics and providing a spring-like restoring force when compressed, said second end thermally conductive material (copper) having a substantially planar surface to interface directly with said IC 7; an interconnect openings between said flexible channel and said conduit to allow a fluid to move between said conduit and said flexible channel; and a port for coupling to a pump 25 coupled to said conduit 1. Yamamoto et

al teach furthermore a heat sink 75 having a plurality of spaced apart planar fins 77, said heat sink being attached to an interior surface of said closed end 3 to conduct heat absorbed by said closed end through said heat sink to said cooling fluid contained within said conduit 1 and said flexible channel 5. Yamamoto et al teach furthermore said resilient material could be pleated (col. 4, line 44). It would have been obvious to one having ordinary skill in the art at the time invention was made to make said resilient material pleated and said heat sink having a plurality of spaced apart planar fins in the device by Downing and Mittal et al as it is disclosed by Yamamoto et al as an obvious matter of design choice, since applicant has not disclosed that choosing a pleated material or providing a heat sink by a plurality of planar fins solves any stated problem or is for any particular purpose and it appears that the invention would perform equally well with any kind of a flexible enough material or a heat sink having enough of a heat dissipating surface.

7. Claims 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Downing in view of Mittal et al as applied to claim 1 above, and further in view of Hisano et al.

Downing and Mittal et al teach all the limitations of the claims except said conduit as a heat pipe comprising a wicking material. Hisano et al teach a cooling device, Fig. 29, for removing heat from an integral circuit 1 (IC), said cooling device comprising: a conduit 81b; a sealed flexible channel 81a having a first open end and a second thermally conductive closed end 82, said flexible channel is made of a resilient material, said second end thermally conductive material having a substantially planar surface to

interface directly with said IC 1; an interconnect openings between said flexible channel and said conduit to allow a fluid to move between said conduit and said flexible channel 81a; wherein said conduit 81b is a heat pipe comprising a wicking material (col.18, lines 19-22). It would have been obvious to one having ordinary skill in the art at the time the invention was made to employ a heat pipe comprising a wicking material, as Hisano et al show it, in the device by Downing and Mittal et al, in order to enhance heat dissipation.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Meeker et al (US Patent 4,138,692) is cited for teaching a similar cooling structure including a flexible channel being conformable with a non-planar integrated circuit (col. 5, lines 11-19).

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael V. Datskovskiy whose telephone number is (571) 272-2040. The examiner can normally be reached on 8-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynn Feild can be reached on (571) 272-2092. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael V Datskovskiy
Primary Examiner
Art Unit 2835

06/21/2006